

As Sea Levels Rise in the Southeast, Are Transportation Planners on Board with Climate Justice?



Photo: Getty Images

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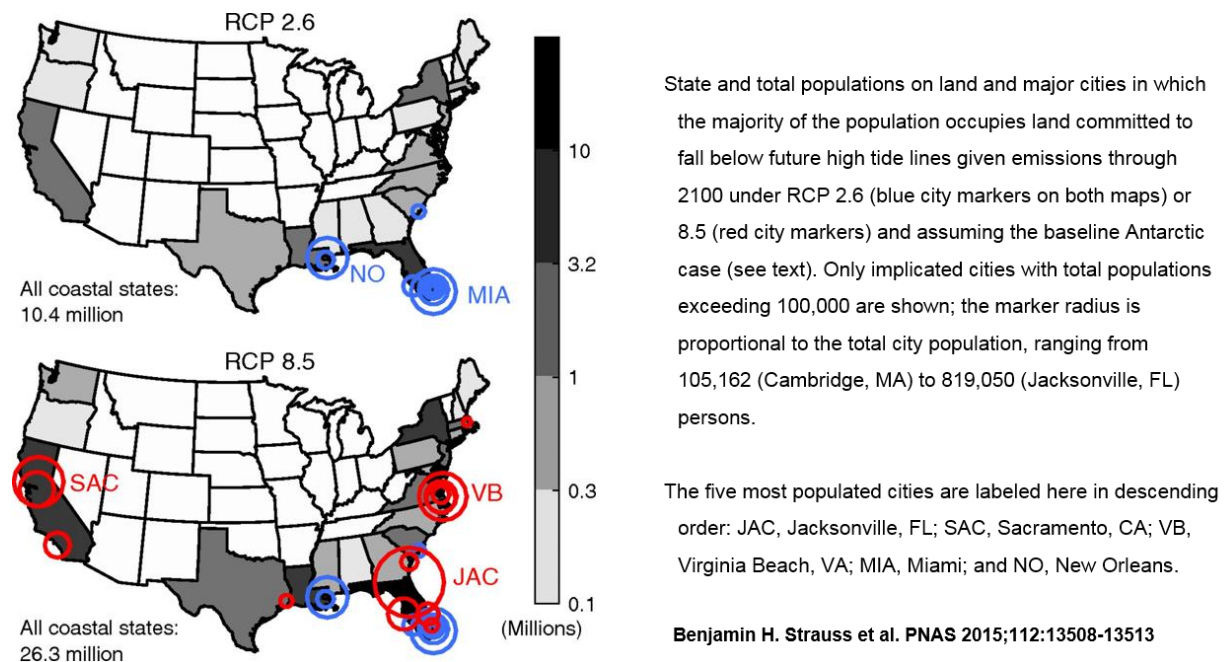
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Why Climate Justice Matters in Transportation

“Seas are rising, and so are we,” reads the headline of a January 2016 story in *The New Tropic*, a news and events magazine in Miami, Florida. The mantra was being chanted by participants of the People’s Climate March, held a few months earlier as part of a nationwide effort to bring attention to achieving climate justice for low-income communities.

With global sea levels predicted to rise about a meter by 2100, hundreds of millions of people are at risk in the United States (**Fig. 1**). A 2015 study published by the National Academy of Sciences found that in a best-case emissions/sea-level rise scenario, most of the land in nine major U.S. cities, including New Orleans and Miami, would be underwater by 2050; in the worst-case scenario, 16 cities would be swamped (Strauss 2015). When taking Antarctic melting into account, studies have predicted at least double the rise (Strauss 2015, Dennis & Mooney 2016).

Fig. 1: Major cities projected to be affected by sea-level rise under two emissions scenarios (as printed in Strauss et al.)



Over the long term, climate factors such as inundation from sea-level rise, storm-induced flooding and temperature extremes will likely affect travel demand by altering settlement patterns, job locations and opportunities, and mode choice – i.e., where we live, where we work, and how we get

there (ICF 2008). In the near term, these factors can make everyday travel difficult or impossible, especially for people reliant on public transportation, shared rides, or older vehicles more vulnerable to breakdowns (SFBCDC 2016). Transit service disruptions and road closures can incur additional and often unaffordable time and expense; climate-change-induced heat and storm extremes can make waiting for transit or walking a dangerous activity, in terms of health as well as from damage to sidewalks and streets (FHWA 2016). These problems disproportionately affect low-income and minority citizens, who historically have been restricted to living in areas more prone to flooding and other hazards (FHWA 2016) and who have seen less investment in infrastructure and maintenance in their neighborhoods.

The frequency and intensity of climate change impacts are rising, experienced as the more frequent, incremental events mentioned above as well as more intermittent, forceful events like hurricanes and storm surges. All communities are affected by this; roads wash out, bridges collapse and flood walls break across the whole of an affected region. But the result of longstanding socioeconomic inequities – including discriminatory policies and practices in housing and transportation facility siting, lending and insurance – is an inequitable exposure to risk for minority and low-income groups (Donner & Rodriguez, 2011).

Vulnerable groups are:

- Less likely to own a personal vehicle
- Less likely to live at higher elevation
- Less likely to have high property value
- Less likely to have outside resources

Differential vulnerability

- Lack alternatives to disruptive situations
 - More persistent damage from flooding
 - Lower priority for mitigation funding
 - Unable to change homes or escape emergencies
- (Donner and Rodríguez; Masozera et al.)



People's Climate March in Miami, Fla., April 29, 2017 (Photo: Miami Herald)

Federal law requires that metropolitan planning organizations (MPOs) include racial, ethnic and national minority groups in the transportation decision-making process. By federal order and agency policy, including that of USDOT, FHWA and FTA, MPOs must also consider environmental justice: whether their policies and investments have a disproportionate, adverse effect on minorities and low-income citizens. However, guidance is generalized; there are few specific thresholds for analysis and no methods of review and enforcement. As transportation planners and government leaders embrace the concept of sustainability and increasingly incorporate climate change into their work, how strong a role will environmental justice play? How might they address inequitable risk, not only of environmental changes but also of potential mitigation and adaptation strategies?

This report contains a review of transportation-related equity planning practice in the southeastern United States, specifically in metro coastal areas expected to be transformed by sea-level rise. Long-range transportation plans and a sampling of other related documents are examined for an explanation of equity-oriented analytical processes; for mentions of climate change; and for any explicit links between the concepts. The intent is to better understand whether – more than 10 years after the devastation caused by Hurricanes Katrina and Rita and the worldwide attention it brought to the region’s infrastructure and social structure alike – our evolving ideals of equity have begun to manifest in planning practice and potential investments.



*People's Climate March in Miami, Fla., April 29, 2017
(Photo: Miami Herald)*

Literature Review

Sustainability, Adaptation and Resilience

Scholarship on the interrelated topics of transportation asset vulnerability, social vulnerability and climate change is substantial and cannot be covered in full here. The topics have tended to meld under the umbrella of sustainable development studies: how government decisions, social structures, and the physical environment (**Fig. 2**) interact as communities seek to lower greenhouse gas emissions and avoid further destruction of man-made and natural resources, preserving economic opportunity and health benefits for future generations. In a broad sense, these interactions tend to be viewed through the lenses of land use, transportation and housing.

Transportation scholarship has examined the relationships between pairs of forces illustrated in the figure below. However, it has less frequently examined how all three interact at once, and how opportunities and hazards might be balanced in the face of increasing distortion. For example, transportation scholars have considered how government should respond to distorted environmental occurrences like climate change (answer: reduction of VMT and GHGs, better engineering) and to social structures (answer: environmental justice methods). But examination of government response to differential vulnerability, a feedback loop in which social distortion magnifies the effects of climate change and vice versa, is far more limited.

Fig. 2: General tenets of sustainability and resilience literature

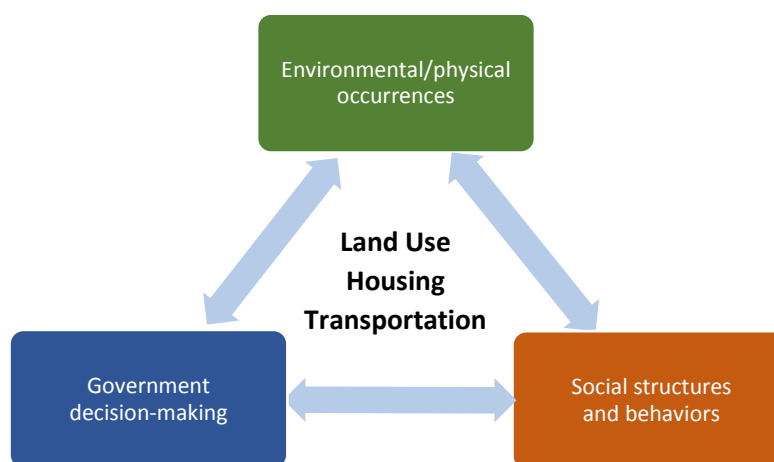
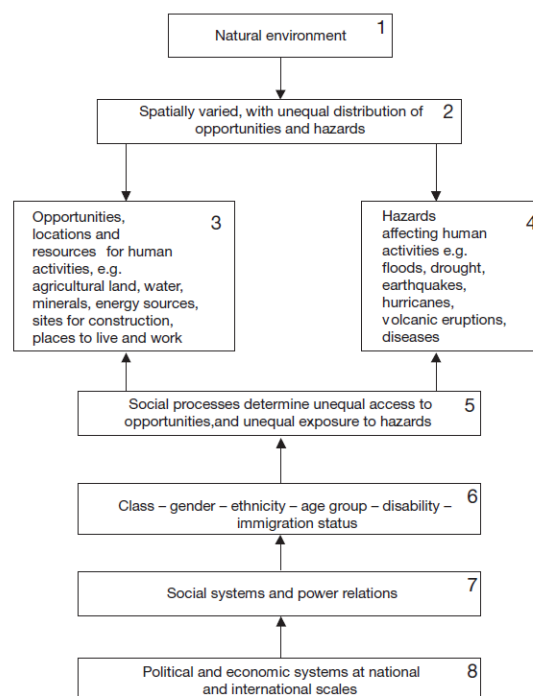


Diagram: Author

One of these interaction types, social vulnerability to the effects of natural disasters, has been studied across several decades, covered thoroughly by Wisner et al. in 2003 (an update to the 1994 first edition). Globally, low-income communities have traditionally been relegated to environmentally risky areas such as low ground, near dumps and toxic waste, etc.; in addition, assets, knowledge, relief and resources for recovery are unequally distributed. “It is these elements that link our analysis of disasters that are supposedly caused mainly by natural hazards to broader patterns in society. These two aspects – the natural and the social – cannot be separated from each other: to do so invites a failure to understand the additional burden of natural hazards, and it is unhelpful in both understanding disasters and doing something to prevent or mitigate them” (Wisner 2003; **Fig. 3**).

Fig. 3: “Social Causation of Disasters,” Wisner et al., 2003



Wisner et al. define vulnerability in this context as "the characteristics of a person or group and their situation that influences their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard." According to researchers Donner and Rodriguez (2011), “Implicit here is ‘differential vulnerability’; that is, different populations face different levels of risk and vulnerability.”

People most at risk in emergencies:

- lack alternative, reliable means of transportation
- lack reliable family or friends in a safe area

- lack financial stability to move the household

Donner and Rodriguez also pose some fundamental questions about becoming proactive in combatting it:

- “How can we expand and strengthen our research initiatives to enhance our understanding of differential vulnerability and to develop more effective policies to protect diverse population groups from disasters, while recognizing the unique risks and vulnerabilities that underrepresented groups confront?
- How will national and global population distribution and the increasing presence of disadvantaged groups continue to affect public safety?
- How can we continue to move governments and decisionmakers to develop and implement policy that moves from a reactive response to a more proactive approach focusing on preparedness[?]” (2011)

Mitigating the effects of differential vulnerability is often part of a larger discussion about how best to create a sustainable future via housing, land use, transportation and health interventions. Citing Adams (2001), Wisner et al. note that “Placing the genesis of disaster in a longer time frame therefore brings up issues of intergenerational equity, an ethical question raised in the debates around the meaning of ‘sustainable’ development.”

With respect to development, the connection between transportation decisions and land use is long-established, notably in the work of Moore and Thorsnes (1994). How to prioritize land use decisions that affect community resilience is a fundamental link made in more recent literature, and has been applied extensively with respect to disaster recovery (Carpenter 2015). Holling (1973) defines resilience as a “...measure of the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables.” The corresponding link between transportation and resilience has relied on “sustainability,” consisting primarily of calls for improved public transit to reduce GHG emissions and to inform an overall land use philosophy aimed at reducing VMT and spatial mismatch.

As a result, the implications for infrastructure often gets the attention. The bulk of proactive, transportation-related climate change literature, pioneered by engineer Michael Meyer and colleagues, focuses on mitigation and adaptation of infrastructure, and on operational systems.

For example, FHWA’s Climate Resilience Pilot Program, which was conducted from 2013 to 2015 by 19 teams across the country, was billed as an assessment of transportation vulnerability aimed at

“enhancing resilience of transportation systems to extreme weather events and climate change.” The studies used FHWA’s Vulnerability Assessment Framework to create scores, which FHWA then encouraged the agencies to use in normal decision-making processes such as transportation planning, project prioritization and system maintenance. The framework’s glossary includes the word “social” in its definition of resilience, but there is no mention of human impacts in the overall process (FHWA 2012).

Defining Environmental Justice

Studies have demonstrated the existence of longstanding inequities in transportation-related funding and decision-making that have disadvantaged minority and low-income groups. There are funding inequities between bus service, which tends to serve more low-income riders, and rail service, which tends to serve higher-income riders; low-income households spend a greater share of their income on transportation; and people of color and low-income communities are often physically separated by transportation infrastructure (Mohl, 2004, Sanchez et al., 2003 and Self, 2003 in Karner and Niemeier, 2013).

The Civil Rights Act of 1964 introduced a legal imperative for equal participation and access in federally funded decision-making, including transportation planning. Title VI of the act states that “no person in the United States shall, on the ground of race, color or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” The U.S. Department of Transportation (USDOT) and Federal Transit Administration (FTA) later established their own Title VI enforcement methods.

Eventually, the government also recognized grassroots efforts asserting that vulnerable communities experience greater exposure to environmental hazards. In 1994, President Bill Clinton issued an executive order making environmental justice a key part of the government’s mission, and directing federal agencies to identify and address the health and environmental impacts of programs, policies, and activities on minority and low-income populations (Miami-Dade MPO 2014). The U.S. Department of Transportation and the Federal Highway Administration issued guidance in this vein in 1997 and 2000, respectively. USDOT’s 2011 statement on climate change included a guideline to “Prioritize the most vulnerable: [...] Issues of inequality and environmental justice associated with climate change impacts and adaptation should be addressed” (FHWA, 2011 June). FHWA encourages analysis of other vulnerable groups, including people with disabilities and zero-vehicle households, but these are not formally required.

Thus, there is stated encouragement to conduct thorough EJ analyses. Guidance is fairly non-specific, however (beyond a list of minority groups and the federal poverty threshold), and there are no methods of review and enforcement, which “has resulted in a situation where the completion of *any* analysis is considered sufficient for compliance” (Karner & Niemeier, 2013). It is up to each agency to determine what “equity” means and to appropriately define its environmental justice communities, in composition and in scale. For example, FHWA (2011 Dec.) suggests in its EJ guidelines: “Using localized census tract data and other relevant information sources, gather data and list any readily identifiable groups or clusters of minority or low-income persons in the EJ study area. Small clusters or dispersed populations should not be overlooked.” It does not specify what might characterize “small” or “dispersed,” nor what it would take to not “overlook” those populations.

Rowangould et al. (2016) found that MPOs’ EJ methodologies have mostly relied on a traditional, geographic-unit threshold approach that may apply to understanding environmental burdens on particular groups but not necessarily their travel behaviors or potential benefits of investments, especially if the target population is not spatially concentrated. The researchers also found examples of planners making assumptions about the inclusion of racial variables in equity analyses, choosing instead to use proxy variables that might unintentionally obscure disparate impact in the results. Ultimately, the specificity of EJ methodology matters; “a regional equity analysis should be able to capture the extent to which racial dynamics operate in a given region, disproportionately affect people of color and other protected populations, and seek to mitigate them” (Karner & Niemeier, 2013).

Current Practice in the Southeast

Environmental justice analyses began in the mid-1990s, but the explicit acknowledgment of climate change arrived about 10 years later. Connecticut was the first state to develop a comprehensive climate-change action plan in 2004. Missoula, Montana’s RTP that same year was the first to incorporate any mention of climate change; Houston-Galveston’s was the first climate-minded RTP in the South, in 2007 (ICF 2010; Thorne 2010). The presence of these elements in long-range transportation plans has certainly increased since then, although there is no consistency between them – state DOTs and MPOs are not federally required to consider climate change in their work. Following are brief summaries of Title VI, environmental justice and climate change links found in the regional transportation plans of selected metro areas around the Gulf Coast.

Houston-Galveston

The barrier island city of Galveston is the place in Texas most vulnerable to sea-level rise. Based on an intermediate-high scenario, research organization Climate Central projects 5.3 feet of rise in Galveston by the end of the century. There is a 16 percent risk of a flood exceeding nine feet by 2030 alone; that would expose more than 90 percent of Galveston's total population to significant risk. About half of those exposed would be classified as "high social vulnerability" (Climate Central 2016).

The Houston-Galveston Area Council (H-GAC)'s regional transportation plan offers a detailed explanation of its environmental justice methodology. It determines its EJ areas and its focuses its outreach based on regional averages of eight indicators: minority population, low-income households, senior population, limited educational attainment, zero-automobile households, female head of household and limited English proficiency.

The assessment explains mobility of the target groups via access to employment centers, medical and educational facilities, and examines congestion mitigation and connectivity. H-GAC's EJ section delves deeper than those of the other case studies, even offering expected effects of specific projects. However, its list of unforeseeable impacts "might include displacements and land use, air quality, and environmental effects." Mention of emissions reductions are related to air-quality standards. Climate change, then, appears to be a part of the unforeseen and remains undiscussed. The most recent report on climate change appears to be one by the agency's Foresight Panel on Environmental Effects, focused on infrastructure adaptations and recommendations to local government, released in 2009.

Mobile, Pensacola, New Orleans

In Mobile, Alabama, along the central Gulf Coast, floods greater than 7 feet pose significant concerns, according to Climate Central. The organization projects 3.8 feet of rise by 2100, with a 16 percent chance of a 7-foot flood by 2030. The area has a relatively low exposure rate. About 15% of people living in areas unprotected by levees are classified as "high social vulnerability" in Climate Central's analysis.

The Mobile Area Transportation Study (MATs) Destination 2040 Transportation Plan has specific Title VI and climate change sections. Like Houston-Galveston, Mobile's MPO provides a well-detailed environmental justice explanation. It measures system impact with "mobility evaluation measures, such as change in travel time, from areas of predominantly low-income and minority populations to essential

services,” and other metrics; it explains its threshold for defining “low-income” and “minority” TAZs; and it mentions drawbacks in particular methodologies (South Alabama RPC, 2015).

As Mobile was part of a federal study on Gulf Coast asset vulnerability, its climate change sections are extensive, far exceeding what other case-study agencies offer. Its assessments are all physical, however; they are linked to neither social vulnerability nor decision-making, except as they relate to public outreach during the plan-creation process.

In Pensacola, Florida, about 60 miles east of Mobile, the Florida-Alabama TPO acknowledges that the state of Florida requires a socio-cultural effects evaluation in LRTPs, but the only environmental justice mention is in plan participation and outreach. Consideration of climate change in the form of “strategies that integrate transportation and land use planning ... to provide for sustainable development and reduce greenhouse gas emissions” is also encouraged by state law. The Bay County (Panama City) TPO’s LRTP summary says that this is included in the plan’s goals. However, none of this is mentioned. The 2035 plan’s community impact assessment detailed the agency’s outreach efforts aimed at specific at-risk groups, but there is no information about impact calculations or methodology.

In contrast, The Regional Planning Commission, the MPO for the New Orleans metro area, is explicit in its Coordinated Public Transit-Human Services Transportation Plan about the challenges of planning for a coastal area susceptible to sea-level rise: “The RPC continually takes these factors into consideration in its planning process, and they have been reflected in this Metropolitan Transportation Plan.”

Under the MTP’s goal of “Environmental Sustainability,” the agency aims to “implement projects that consider the impacts of climate change and natural hazard mitigation,” referring to the planning, selection and design of roadway projects as described in the strategies. The performance measures for this goal include the number of projects that raise roadway grade, resist high wind speeds, and other resiliency-increasing efforts. Unlike the agency’s strategies on bike/ped facilities and transit, this portion does not link equity or justice to its planning and project selection.

More than the other case studies examined, the New Orleans RPC is upfront about past, current and ever-changing demographic and climactic challenges. Its link between those is not completely clear, but it appears to have the most potential for examining climate-related disproportionate impacts in the future.

Miami

Miami-Dade County, Florida, is the seventh most-populous county in the nation and the center of a 5.8 million-person urbanized area, according to the U.S. Census Bureau. The South Florida region could be considered “ground zero” for sea-level rise in the United States with respect to the number of people expected to be affected over the next century.

The Miami-Dade 2040 LRTP does not appear to enumerate the components of its equity analysis or its EJ variables. The plan mentions some vulnerable groups and mentions climate change in its section on sustainability, which is divided into three pillars. One, “Socially Responsible,” emphasizes the importance of mobility for the county’s substantial segment of senior citizens and those with disabilities, who may not have access to or be able to operate a personal vehicle. However, other populations are not mentioned.

“One way to plan for and accommodate different users is by providing solutions and options that work for those who have the greatest needs. By reaching out to citizens and communities, as well as providing for numerous public meeting forums, the MPO made age-friendly transportation a high priority” (Miami-Dade MPO, 2014).

With respect to climate change, challenges and steps taken are outlined in Pillar 2, “Environmentally Sound”; but mentions of vulnerability refer only to facilities and infrastructure.

In a later section titled “Environmental Justice and Title VI,” the MPO describes its compliance with federal equity mandates. A table denotes minority groups that have been targeted for outreach with study materials and brochures (**Fig. 4**, following page), and a link directs planners to a mapping tool where they can create customized demographic reports. All of these efforts are aimed at the public involvement process. It is unclear whether these subgroups were considered with respect to decision-making and equity outcomes.

The only obvious mention of EJ within the LRTP supporting documents is in the 2017-18 Unified Planning Work Plan: “Assess Environmental Justice impacts” is a required activity for Special Projects (corridors). The Southeast Florida 2040 RTP Transit Plan offers a few more specifics, mentioning impacts on three groups: age 65 and older, low-income households (earning less than \$25,000/year) and zero-vehicle households at the census tract level.

Fig. 4: Outreach cited for Title VI and EJ compliance in Miami-Dade LRTP

Table 4-1 | Low-Income and Transit Dependent Populations

Organization	African-Americans	Disabled	Haitian Americans	Hispanics	Homeless	Migrants	Native Americans	Elderly
Amigos For Kids				•				
Biscayne Gardens Civic Association		•						
Black Affairs Advisory Board	•		•					
Coconut Grove Collaborative	•							•
Coalition of Farmworkers Organization				•		•		
Goulds CDC	•	•		•				•
Hispanic Coalition				•				•
Miccosukee Tribe of Indians of Florida							•	
Miami Lighthouse for the Blind		•						
Richmond Heights Homeowners Association	•							•
Sagrada de Familia				•				•
Under-represented People Positive Action Council	•							•
Veccion de Acción				•				•
We Care of South Dade	•	•	•	•	•	•	•	•
Wilde Community Center	•	•		•				•

Considerations for Improvement

Based on a review of LRTP documents, the agencies in charge of regional transportation systems in the Southeast appear to be opaque with respect to assessing their specific role in allaying inequitable risk to climate change. That WILMAPCO in Delaware, a much smaller MPO in a different socio-political environment, is completely open on this topic, suggests that there could be political sensitivities keeping the MPOs from revealing details of its climate justice-related methodologies – if they exist at all. A statement from WILMAPCO’s sea-level rise assessment reads:

Recent WILMAPCO studies have shown that low-income and minority neighborhoods in the Wilmington region do not receive their fair share of transportation investment, and, with elevated exposure to mobile source emissions, indeed carry more than their fair share of the transportation system’s burden.

Breaking the barriers that led to the ugly aftermath of Hurricane Katrina along the Gulf Coast, and fully lifting the transportation burdens carried by low-income and minority groups will be a long-term process. As we plan for sea-level rise and the increase of severe weather events associated with climate change, along with other initiatives, we must be particularly aware of the impacts to our low-income and minority neighborhoods. (Wilmington Area Planning Council 2011)

Acknowledgement of the realities of climate change and consistency in environmental justice assessments would go a long way in producing actionable, comparable assessments of differential vulnerability in a region. In some places, “environmental justice” and Title VI are interpreted as being useful in the outreach/feedback stage, rather than calculated earlier in impacts. Indeed, a 2011 report on Title VI and MPO planning processes in Florida found that while knowledge of EJ and Title VI were widespread and had steadily increased over the years, “Public involvement is currently the primary method used by MPOs to address these needs” (Kramer et al., 2011). The report’s authors suggested that Florida MPOs work on identifying protected populations, public involvement, evaluating benefits and burdens and training staff and consultants. Climate-specific public outreach could be a way to gain insight that would improve decision-making in this regard.

Additionally, reflecting much of the established literature, many of the MPO and climate change related plans are focused on the implications for infrastructure, under the umbrella of sustainability. This tends to produce a focus on reduction of GHGs and VMT. However, effective GHG and VMT reduction strategies could adverse consequences: projects to reduce flooding, erosion or run-off might increase highly allergenic ground cover or trees, disproportionately affecting vulnerable groups where allergies and asthma are more prevalent; concentrating institutions like schools, senior housing/facilities or hospitals along high traffic transit routes will reduce VMT but create concentrated exposure to airborne pollution (Bartholomy, 2008). It is important to analyze facility siting and improvements to ensure that they are, in fact, beneficial to the communities in question.

Tools and strategies to examine EJ and climate risk

There are some human-centered tools and strategies available to help MPOs and other agencies make the connection between inequitable vulnerability and sea-level rise.

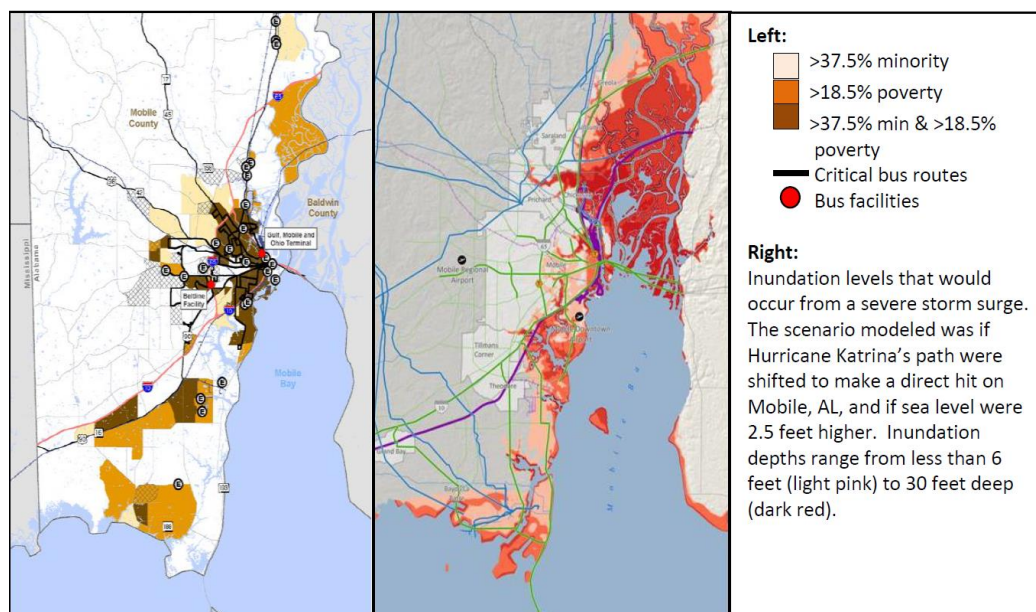
Rowangould et al. (2016) describe, in addition to threshold- and population-weighted measures of determining EJ communities, a “community-based identification” method for identifying vulnerable

geographic areas, which was employed during the RTP update process in Fresno, California, in 2014. In this method, environmental justice and health organizations reached out via community meetings to find out how citizens defined their own needs. In South Florida, organizations such as Catalyst Miami have organized marches and conversations among predominantly African-American and Latino communities like the one held in early 2016, “Anti-Poverty Summit: Building Climate Resilience and Social Equity in South Florida” (Nebhrajani, 2016).

Mapping overlay tools are recommended by several entities at the forefront of climate justice analysis. In June 2016, FHWA published a short paper called “Climate Change and Environmental Justice: Considerations for Transportation Decision-making,” in which it suggested that MPOs and DOTs map “climate equity hotspots,” which are communities whose socioeconomic factors elevate their risk of coastal flooding. It is based on a method that utilizes county-level data on per-capita income, poverty, race/ethnicity, and education level (Cleetus, 2015).

The agency also highlighted a USDOT criticality assessment that mapped low-income and minority populations, major employers, attraction zones, and other factors to help determine the relative value of transportation assets. These were then compared to climate change impacts, which helped demonstrate, for example, how to prioritize bus facilities based on their service to vulnerable populations (Fig. 5).

Fig. 5: Criticality and exposure mapping of Mobile, Ala. (US DOT Gulf Coast Study Phase II, via FHWA)



Finally, the Social Vulnerability Index – created by the CDC’s Agency for Toxic Substances and Disease Registry – can provide a base for these localized GIS analyses. It uses census tracts as units of analysis and is billed as an emergency planning aid, but the tool can be adapted for best practice in the transportation realm as needed. The index takes into account characteristics like socioeconomic status, gender, race and ethnicity, age, employment loss, rural or urban residency, residential property (value, quality, density), renters, occupation, family structure, education, social dependence, medical needs and access, special-needs, language barriers and vehicle availability (ATSDR n.d.). University research partnerships can prove fruitful in this regard, making available analytical time not necessarily available or politically feasible at the agency level to customize and use the tool.

Conclusion

As it stands, MPOs in the Southeast comply, albeit inconsistently, with federal mandates on environmental justice, but conceptual linkages to climate change vulnerability are mostly tenuous or nonexistent. They are not quite at the forefront of analysis that could save lives and money in the future as the stakes get higher, and they should be; regional work can and does guide local, impactful decision-making. It is vital to look at the overlay of these decisions, and transportation planners, with their focus on access and mobility, and the necessity of multi-jurisdictional focus, have insight that may be hard to see for local planners and decision-makers. Consideration of the relationship between environmental justice communities, such as low-income or zero-vehicle households, and investment decisions in their roads, transit routes and bridges shape or set the stage for local land use, economic development, health, and community resilience.

Socially focused, proactive decision-making reduces future financial costs by improving resilience, and potentially reduces political costs by improving quality of life. Whether each agency ultimately chooses to protect vulnerable communities or no, a forward-thinking approach to the intersection of climate change, land use and transportation decision-making at least gathers a greater number of citizens into a more mature conversation. This not only advance the principles of economic justice, it protects the vitality – and the very existence – of cities, regions and the nation.

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